REMARKS

The following remarks are made in response to the Final Office action of January 7, 2010. The Examiner's reconsideration is respectfully requested in view of the same. No new matter has been added, remarks have been made for purposes of clarifying the claimed invention.

No claims have been amended. Claims 1-10 are pending for further prosecution on the merits upon entry of the present amendments.

Applicants submit that the claims as presented are in condition for allowance.

Claim Rejections Under 35 U.S.C. § 102

In order to anticipate a claim under 35 U.S.C. §102, a single source must contain all of the elements of the claim. *Lewmar Marine v. Barient, Inc.*, 827 F.2d 744, 747, 3 U.S.P.Q.2d 1766, 1768 (Fed. Cir. 1987), *cert denied*, 484 U.S. 1007 (1988). Moreover, the single source must disclose all of the claimed elements "arranged as in the claim." *Structural Rubber Prods. Co. v. Park Rubber Co.*, 749 F.2d 707, 716, 223 U.S.P.Q. 1264, 1274 (Fed. Cir. 1984). Missing elements may not be supplied by the knowledge of one skilled in the art or the disclosure of another reference. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 780, 227 U.S.P.Q. 773, 777 (Fed. Cir. 1985).

Claim 1

Claim 1 stands rejected under 35 U.S.C. § 102(e) as being allegedly anticipated by Jain et al. (U.S. Patent no. 6,797,412, hereinafter "Jain"). The Examiner states that Jain discloses all of the elements of claim 1, primarily in FIGS. 6, 8 and 9 and the associated portions of the detailed description. Applicants respectfully traverse for at least the following reasons.

Jain discloses an EL device structure including a substrate 26, a layer of indium tin oxide ("ITO") 27, a layer of dielectric material 28, a layer of quantum dots 15, another layer of dielectric material 28 and a metal layer 29, all disposed in sequence on one another. (See specifically FIG. 6). The Examiner alleges that the dielectric layer 28 of

Jain is equivalent to the inorganic electron transport layer as claimed. (See pages 2-4 of the present Office action).

Applicants respectfully submit that the dielectric layer 28 of Jain is not an electron transport layer as would be known to one of ordinary skill in the art and as described throughout the instant application. A dielectric material is a non-conducting substance, e.g., an insulator, and therefore prevents the flow of current therethrough. Thus, rather than promoting the transport of electrons therethrough, as would be the case of a hole transport layer as known to one of ordinary skill in the art, the dielectric material actually prevents or hinders the flow of electrons therethrough. Thus, the dielectric material 28 is not equivalent to a hole transporting material as claimed.

Further buttressing this point is the fact that later in the application of Jain, hole transporting layers are explicitly labeled as such. See specifically FIGS. 8A-8D, elements 44, 47 and 48. This indicates that similar terminology is used in both Jain and the instant application. Therefore, the fact that the dielectric materials 28 are not labeled as electron transporting materials teaches away from the dielectric materials 28 being equivalent to the claimed electron transporting materials.

The Examiner's argument, as presented in pages 2 and 3 of the present Final Office action is that the electron transport layer as claimed "is made from materials such as Si3N3, Ta203, BaTiO3, Al2O3" and that these materials are dielectric materials. The Examiner then states that because Jain discloses dielectric materials "such as SiON, Ta2O5, BaxSr1-xTiO3", the two layers are equivalent. Applicants respectfully traverse for at least the following reasons.

First, technically any substance with even slight insulating characteristics may be called a dielectric, and thus any assertion that a material that is dielectric is similar to any other substance that is dielectric is tenuous at best. For example, one of ordinary skill in the art would know that glass is a dielectric material, but one of ordinary skill in the art would not suggest that glass was equivalent to every other dielectric material, and in fact glass would not be a suitable electron injection material as claimed due to its insulating nature. Second, while the Examiner has identified several materials that may be used for the dielectric layer 28 of Jain, none of the identified materials match the materials listed in the present application for use as an electron transport layer. If in fact the dielectric

layer materials of Jain were commonly used as an electron transport layer as claimed, one of ordinary skill in the art would expect some overlap between the materials. Instead, there is none.

In addition, claim 1 reads, *inter alia*, "an inorganic quantum dot light-emitting layer is provided between the top electrode and the bottom electrode". [Emphasis added] There is no disclosure in Jain that the layer of cladded nanocrystals ("CNCs") 15 are inorganic. Instead, Jain states, "[t]he profound permeability of organic compounds to moisture and oxygen requires the grown[sp] of a protective outer passivation layer on the CNCs." (See column 6, lines 32-37). This suggests that at least the CNCs 15 are organic.

The Examiner presents an argument on page 3 of the present Final Office action stating, "Jain teaches … a pseudomorphic cladded quantum dot nanophosphor material. Therefore, the 102 rejection is proper and maintained." Applicants respectfully traverse for at least the following reasons.

The Examiner asserts that Jain discloses an inorganic quantum dot light-emitting layer in the pseudomorphic cladded quantum dot nanophosphor material of element 15. (See column 5, lines 35-36 and column 2, lines 55-59. However, Applicants respectfully assert that there is no disclosure that the pseudomorphic cladded quantum dot nanophosphor material is inorganic. The term "pseudomorphic cladded quantum dot nanophosphor material" in Jain refers to the CNCs 15. Instead, as pointed out above, the CNCs 15 include primarily organic components.

For at least the reasons discussed above, Jain does not disclose: **an inorganic quantum dot light-emitting layer provided between the top electrode and the bottom electrode; and an inorganic electron transport layer disposed between the inorganic quantum dot light-emitting layer and the top electrode** as claimed in independent claims 1 and 10.

Thus, claims 1 and 10 are believed to be patentably distinct and not anticipated by Jain.

Accordingly, Applicants respectfully request reconsideration of the rejection of claim 1 under 35 U.S.C. § 102 with respect to Jain.

Rejections Under 35 U.S.C. § 103

In order for an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all of the elements of the invention are disclosed in the prior art and that the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. See MPEP 2143.

Claims 1-10

Claims 1-10 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Bulovic et al. (U.S. Patent Publication No. 2004/0023010, hereinafter "Bulovic") in view of Kishigami (Japanese Patent No. 200-215984, hereinafter "Kishigami"). The Examiner states that Bulovic discloses all of the elements of the abovementioned claims except, *an inorganic electron transport layer*, which the Examiner further states is disclosed primarily in the abstract of Kishigami. The Examiner states that it would have been obvious for one of ordinary skill in the art to use the inorganic electron transport layer of Kishigami in place of the organic electron transport layer of Bulovic for the purpose of "having a device capable of continuously and stably emitting light for a long time with a high luminance". Applicants respectfully traverse for at least the following reasons.

Bulovic is directed towards a light-emitting device including semiconductor nanocrystals, the device including a substrate 1 (Glass in FIG. 2), a first electrode 2 (ITO in FIG. 2), a first layer 3 (a hole transporting layer TPD:QDs in FIG. 2), an organic light-emitting layer of Alq3 (shown only in FIG. 2, but discussed as being between layers 3 and 4 with respect to an alternative embodiment of FIG. 1), a second layer 4 and a second electrode 5 (Mg:Ag and Ag in FIG. 2). (See FIGS. 1-2B and the associated description thereof in the specification of Bulovic).

Applicants specifically note that the separate light-emitting layer illustrated in FIG. 2 of Bulovic is an organic layer, and does not include quantum dots as would be known to one of ordinary skill in the art. Alq3 is a well-known, commonly used, organo-metallic chelate used as an organic emission layer in OLEDs, whereas one of ordinary skill in the art would recognize that quantum dots are used to form light-emitting diodes

in place of organic materials. (See page 1, lines 23-29 of the present application). However, Bulovic may also disclose a light-emitting layer including inorganic quantum dots as illustrated in paragraphs 0027 and 0033 of Bulovic as indicated on page 3 of the present Final Office Action.

However, as admitted by the Examiner on pages 3 and 5 of the present Final Office action, Bulovic does not disclose an inorganic electron transport layer on the inorganic quantum dots. Specifically, Bulovic does not disclose, teach or suggest: **an inorganic quantum dot light-emitting layer provided between the top electrode and the bottom electrode; and an inorganic electron transport layer disposed between the inorganic quantum dot light-emitting layer and the top electrode** as claimed in independent claims 1 and 10. The Examiner looks to Kishigami to cure the admitted defects of Bulovic.

Kishigami discloses an organic electroluminescent element including a cathode 2, an electron transport layer 3, an organic electroluminescent layer 4, a hole transport layer 5, an anode 6 and a substrate 7. (See Abstract, associated figure and Title of the invention).

While Kishigami may disclose that the electron transport layer 3 includes an inorganic compound semiconductor, Kishigami does not disclose that the electron transport layer 3 is disposed between an inorganic quantum dot light-emitting layer and a bottom electrode. First, Kishigami does not disclose that the electroluminescent layer 4 includes quantum dots. Second, contrary to the light-emitting layer as claimed, the electroluminescent layer 4 of Kishigami is an organic layer (hence the apparatus 1 is an organic electroluminescent element and the invention title is directed towards an organic electroluminescent element).

Specifically, Bulovic discloses an inorganic light-emitting layer and an organic electron transport layer and that Kishigami discloses the use of an organic light-emitting layer and an inorganic electron transport layer. The Examiner then argues that it would have been obvious to one of ordinary skill in the art to contemplate replacing the electron transport layer of Bulovic with the inorganic electron transport layer of Kishigami in order to provide an EL device capable of continuously and stably emitting light for a long time with a high luminance.

First, both Bulovic and Kishigami disclose the use of opposing material layers, i.e., when the light emitting layer is organic the electron transport layer is inorganic, as in Bulovic, and when the light emitting layer is inorganic the electron transport layer is organic, as in Kishigami. Neither Bulovic nor Kishigami disclose that both layers may be inorganic.

Second, while Kishigami may disclose the use of an inorganic electron transport layer, it only does so in the context of the use of an organic light emitting layer and says nothing about the use of the inorganic electron transport layer with an inorganic light emitting layer. There is no disclosure, teaching, suggestion or motivation to combine the inorganic electron transport layer with the organic light emitting layer of Bulovic as suggested by the Examiner. There is no disclosure, teaching or suggestion within Kishigami or Bulovic that including the inorganic electron transport layer in a device using an inorganic light emitting layer would result in the benefits alleged by the Examiner.

Instead, the omission of such disclosure in either Bulovic or Kishigami, despite both applications dealing with light-emitting devices including both inorganic and organic components, indicates that the claimed structure is unique and would be nonobvious to one of ordinary skill in the art.

Therefore, Kishigama does not cure the defects noted above with respect to Bulovic. Namely, Kishigama does not disclose, teach or suggest: **an inorganic quantum dot light-emitting layer provided between the top electrode and the bottom electrode; and an inorganic electron transport layer disposed between the inorganic quantum dot light-emitting layer and the top electrode** as claimed in independent claims 1 and 10.

Applicants submit that Bulovic and Kishigama, either alone or in combination, do not render obvious the subject matter of claims 1 and 10. Claims 2-9 depend from claim 1, and thus include the allowable elements of claim 1. It is thus believed that the dependent claims are patentable over the cited references for at least the reasons given above for independent claim 1.

Accordingly, it is respectfully submitted that the claimed invention is allowable over the cited references. The Examiner's reconsideration and withdrawal of the rejection of claims 1-10 over Bulovic and Kishigama, is respectfully requested.

Conclusion

In light of the above remarks, the present application, including claims 1-10, is believed to be in condition for allowance.

Applicants hereby petition for any necessary extension of time required under 37 C.F.R. 1.136(a) or 1.136(b) which may be required for entry and consideration of the present Reply.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the outstanding rejections. If there are any charges due with respect to this response, please charge them to Deposit Account No. 06-1130 maintained by Applicants' Attorneys.

Respectfully submitted,

By: /John W. Stankiewicz/

James J. Merrick
Registration No. 43,801
John W. Stankiewicz
Registration No. 60,169
Cantor Colburn LLP
20 Church Street, 22nd Floor
Hartford, CT 06103-3207
PTO Customer No. 23413
Telephone: (860) 286-2929
Fax: (860) 286-0115

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